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Supreme Court of the United States
OCTOBER TERM, 1998

KUMHO TIRE COMPANY, LTD., *et al.*,
Petitioners,
v.
PATRICK CARMICHAEL, *et al.*,
Respondents.

On Writ of Certiorari to the United States Court of Appeals for the Eleventh Circuit

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BRIEF OF *AMICI CURIAE* AMERICAN INSURANCE ASSOCIATION AND NATIONAL ASSOCIATION OF INDEPENDENT INSURERS IN SUPPORT OF PETITIONERS

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BRIEF OF *AMICI CURIAE* AMERICAN INSURANCE ASSOCIATION AND NATIONAL ASSOCIATION OF INDEPENDENT INSURERS IN SUPPORT OF PETITIONERS

INTEREST OF THE *AMICI*

Amici curiae American Insurance Association ("AIA") and National Association of Independent Insurers ("NAII") respectfully submit this brief in support of petitioners.[1]

AIA and NAII are national insurance industry trade associations whose member companies write a substantial

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[1] Pursuant to Supreme Court Rule 37.6, *amici curiae* state that no counsel for any party to this dispute authored this brief in whole or in part and no person or entity, other than *amici curiae* and their member insurance companies, made a monetary contribution to the preparation or submission of this brief.

portion of the property and liability insurance sold in the United States, including products liability, commercial liability, and other coverages significantly affected by the issues in this case. Under these forms of insurance coverage, AIA and NAII members defend and indemnify manufacturers and other policyholders against liability for products, operations or conduct causing property damage, personal injury or economic loss. AIA and NAII regularly participate as *amici curiae* in litigation, such as this case, significantly affecting the tort liability system and insurance covering such liabilities.

This case presents an important issue concerning the admissibility of expert evidence in cases involving liability for allegedly defective or unsafe products: whether engineering and similar "applied science" testimony must satisfy the reliability standard for scientific testimony established in *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 509 U.S. 579 (1993). Products liability and other liability lawsuits commonly involve expert testimony by engineers or similar technical experts whose testimony is based on their application of scientific principles and methods, commonly referred to as "applied science." The testimony of applied science experts is routinely introduced to establish essential elements of liability claims, such as industry standards of care, design or manufacturing defects, and causation.

Juries tend to give considerable credence to the testimony of engineers and others holding themselves out to be experts with a grounding in scientific training, principles and methodologies. Accordingly, the testimony of such experts often has a significant impact on the fact-finder's ultimate resolution of the liability claim.

For that reason, standards for the admissibility of applied science expert testimony in tort liability cases significantly affect insurers. AIA and NAII members write insurance policies indemnifying product manufacturers and others based on the insurers' evaluation of the risk of

future loss which, in no small part, depends on the legal rules governing proof of liability. The unchecked admission of expert testimony purporting to be based on applied science makes the outcome of liability cases more uncertain. This increased uncertainty, in turn, makes insurers less willing to assume risks and unable to accurately price their coverages. A lax system for the admission of applied science testimony thus, in the end, detrimentally affects the affordability and availability of liability insurance.

Therefore, AIA, NAII and their members have a substantial interest in ensuring that only applied science expert testimony based on established scientific principles and reliable methodologies is admitted into evidence. The purpose of this brief is to give the perspective of liability insurers, as major participants in the tort liability system, on the need for application of the *Daubert* reliability standard to applied science testimony.[2]

SUMMARY OF ARGUMENT

The concerns which led this Court, in *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 509 U.S. 579 (1993), to require that the trial court assess expert testimony by research and experimental scientists for reliability, apply with equal force to the testimony of engineers and other "applied science" experts. The scientific basis of applied science testimony, its significant impact on the jury, and the language and purposes of Federal Rule of Evidence 702 all demonstrate that engineering and similar expert testimony based on the application of established scientific principles to a concrete problem should be subject to the same screening for reliability as other types of scientific testimony.

Engineering is the application of generally-accepted scientific principles and methods to practical problems.

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[2] All parties have given blanket consent to the filing of all *amicus* briefs in this case, in letters of consent filed with the Office of the Clerk of this Court.

Accordingly, testimony by expert engineers is based on "scientific knowledge" to the same extent as expert testimony by research or experimental scientists.

Neither *Daubert* nor Rule 702 provide any basis for distinguishing between applied science and theoretical science testimony. Rule 702 does not lay out different standards for the admissibility of different types of science-based expert testimony, but uniformly applies to all testimony based on "scientific knowledge." Further, when this Court in *Daubert* emphasized that its holding was not limited to "novel" science, it implicitly encompassed testimony based on established scientific principles, which is the essence of applied science.

Daubert thus should govern the testimony of applied science experts, notwithstanding characterization of that testimony as based on "experience" rather than scientific methods or principles. The expert conclusions drawn by an engineer are not founded on the untutored experience of a layman, but on experience in the application of scientific principles and observations evaluated in light of those principles.

Alternatively, if applied science testimony is deemed a hybrid of "technical" as well as "scientific" elements, the *Daubert* reliability standard should still be applied. Even where engineering testimony is not based entirely upon the employment of a scientific methodology—the formulation and testing of a hypothesis—it still ultimately is based on scientific knowledge and methods. Moreover, there is no principled or administratively feasible basis for distinguishing between the scientific and technical elements of applied science testimony. Nor does Rule 702, on its face, permit application of different admissibility standards.

Application of *Daubert* to applied science testimony is also consistent with the purposes of Rule 702 as described by this Court. Science-based testimony can have a powerful impact on juries because the average layperson regards science as "infallible" and because of a natural

deference to expertise on highly technical issues. Thus, the same concerns which drove the Court in *Daubert* to impose a screening requirement to assure the reliability of experimental science testimony apply equally to applied science testimony.

If anything, applied science testimony can have a greater potential to mislead the factfinder. When expert testimony on "cutting edge" science is admitted, the jury will at least be aware that the testimony is based on novel or contested principles. In contrast, applied science, by definition, involves the application of *established* scientific principles. Accordingly, unless engineering and similar testimony is subject to screening to determine its reliability, a jury may accept the expert's conclusions under the assumption that they are founded on an uncontested scientific method or principle. More simply, there is a potential problem of "junk engineering" testimony no less serious than the problem of "junk science" testimony addressed in *Daubert*. For this reason, the analysis in *Daubert* should be applied to engineering testimony.

Indeed, the need to ensure the reliability of applied science testimony will take on greater importance in coming years because of increased litigation over allegedly defective computer and other information technology products. For example, lawsuits already have begun to be filed claiming that computer software was defectively designed because of a "Year 2000" problem. Some experts have predicted an avalanche of such legal actions as the millenium approaches. Whereas expert disputes in the past have involved "hard" science as in *Daubert*, technology-related litigation will focus more on the testimony of applied science experts such as computer scientists and software engineers. Application of *Daubert* will help to assure that the factfinder in these high-technology disputes will be guided by expert testimony that is reliable and useful.

ARGUMENT

I. THE *DAUBERT* RELIABILITY STANDARD SHOULD BE APPLIED TO EXPERT ENGINEERING AND SIMILAR APPLIED SCIENCE TESTIMONY BECAUSE IT IS BASED ON SCIENTIFIC KNOWLEDGE

Rule 702 of the Federal Rules of Evidence provides that a witness "qualified as an expert" may testify to "scientific, technical, or other specialized knowledge . . . in the form of an opinion or otherwise." Fed. R. Evid. 702. In *Daubert*, 509 U.S. 579, this Court interpreted Rule 702 to require the district judge to act as an evidentiary gatekeeper and ensure that proffered testimony by a scientific expert is based on a reliable scientific foundation and is relevant to the issues in the case. The question presented in this case is whether the expert testimony of an engineer, with a masters of science degree, is "scientific" testimony to which *Daubert*'s admissibility standard applies or, alternatively, involves "technical knowledge" to which *Daubert* should also apply.

A. Applied Science Testimony Is Scientific Testimony Within the Meaning of *Daubert*

Daubert adopted a broad definition of "scientific" testimony consistent with the common understanding of that term. The Court expressly stated that its decision was not limited to "novel" science. *Daubert*, 509 U.S. at 592 n.11. Nor did the Court limit its definition of "scientific testimony" to testimony based on experimental, research or "hard" science. Rather, the Court referred broadly to "scientific testimony" as testimony "ground[ed] in the methods and procedures of science." *Id.* at 590; *see also Webster's Third New International Dictionary* 2033 (1986) (defining "scientific" as "relating to, or exhibiting the methods or principles of, science").

Applied science testimony fits within this definition because it too is based on scientific methods and principles.

Indeed, engineering is the application of scientific principles and methods to practical problems. *See Webster's Collegiate Dictionary* 383 (1993) (defining engineering as "the application of science and mathematics by which the properites of matter and the sources of energy in nature are made useful to people"); *see also* Lee H. Johnson, *Engineering: Principles and Problems* 5 (1960) ("One might say that engineering is the application of scientific knowledge and of judgment to practical problems involving the forces and materials of nature.").

Engineering experts are learned in science, having earned bachelors or masters degrees in science or having obtained equivalent certification from an appropriate professional body. They are trained to apply established scientific principles in order to create products or processes for human use. *See* Johnson, *supra*, at 5 (" 'Engineering is the scientific utilization of the forces and materials of nature in the design, construction, production, and operation of works for the benefit of man.' ") (quoting Clement C. Williams & Erich A. Farber, *Building an Engineering Career* ch. 2 (1957)).

Thus, the work and advice of engineers ultimately is based on application of scientific principles, whether by a specific scientific methodology involving formulation and testing of a hypothesis or by accumulated experience. *See* Johnson, *supra*, at 6 (describing engineering "[m]ethods" as "[p]rimarily the applications of the principles of mathematics, physics, and chemistry to the problems of the engineer, or in a phrase, the artful application of the engineering sciences"). The engineer's experience is evaluated through the prism of training in scientific principles, and consists of accumulated observations evaluated in light of scientific knowledge.

In sum, applied science testimony fits within the scope of this Court's definition of "scientific" testimony. The reliance on scientific principles is no less apparent because the issue involves application of those principles to a practical problem rather than to an experimental or

theoretical question. *See Cummins v. Lyle Indus.*, 93 F.3d 362, 368 n.2 (7th Cir. 1996) (refusing to "abandon[] . . . the *Daubert* analysis simply because the issue before the court, although rooted in science, involves the application of science to a concrete and practical problem"). The reliability and usefulness requirements of *Daubert* should therefore encompass applied science expert testimony just as they do expert testimony based on scientific theory or experimentation.

B. Reliability Is as Essential for Expert Testimony Based on Applied Science as It Is for Testimony Based on Research Science

Applied science testimony raises the same concerns that led the Court in *Daubert* to require a reliability analysis of expert testimony based on experimental or research science.

Jurors carry a belief in the "infallibility" of science, which leads them to give more weight to testimony that they perceive to involve science. *See* Edward J. Imwinkelried, *The Next Step After Daubert*, 15 Cardozo L. Rev. 2271, 2286 (1994) (" '[t]here is virtual unanimity among courts and commentators that evidence perceived by jurors to be 'scientific' in nature will have [a] particularly persuasive effect.' ") (citation omitted). Because engineers are qualified as experts on the basis of their scientific training and experience, their testimony can have as persuasive an effect on juries as the testimony of a research or experimental scientist.

As a practical matter, applied science experts are relied upon in products liability cases as heavily and as frequently as research scientists are in toxic tort cases. The widely-discussed problem of "junk science" in the toxic tort area thus has a corollary in the area of products liability. "Junk science cuts across chemistry and pharmacology, medicine and engineering." Peter W. Huber, *Galileo's Revenge: Junk Science in the Courtroom* 3 (1991). Products liability suits regularly involve expert testimony

that a product was defectively designed and could have been based on an alternative, safer design. Without adequate assurance that such testimony is reliable, virtually every accident involving a manufactured product could be transformed into an industrywide challenge to product design.[3]

Applied science experts thus should not be allowed to escape the scrutiny given to experimental or theoretical science experts. A court should examine whether the applied science expert is relying on established scientific and engineering principles to reach his or her conclusion and whether those principles have been applied to the facts in a methodologically reliable manner. *See Daubert*, 509 U.S. at 590-91; *General Elec. Co. v. Joiner*, 118 S. Ct. 512, 519 (1997) (in screening testimony for reliability, a district court "may conclude that there is simply too great an analytical gap between" a conclusion and the data or process by which the conclusion was based).

C. The Scientific Nature of an Applied Science Expert's Testimony Should Not Depend on the Expert's Own Characterization of the Testimony as Based on "Experience" Rather Than Scientific Principles or Theories

The Eleventh Circuit in this case did not deny that testimony "based on [an engineer's] application of scien-

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[3] An example of unreliable and result-oriented applied science is the testimony given by automative engineers in the Audi "sudden acceleration" cases. The experts first testified that the car was defective because it "suddenly accelerated" even when the driver stepped on the brake pedal. Subsequently, however, studies found that driver error was the likely cause of sudden acceleration—drivers were unintentionally stepping on the accelerator rather than the brake—and juries correspondingly did not find product defect based on sudden acceleration. Experts for claimants then altered their testimony to opine that the car was defective because the brake pedal and the accelerator were too close to one another and allowed a driver to mistakenly step on the accelerator when he or she meant to place that foot on the brake. *See*, Huber, *supra*, at 57-74.

tific principle or theories . . . should [be] submit[ted] to a *Daubert* analysis. . . ." *Carmichael v. Samyang Tire, Inc.*, 131 F.3d 1433, 1436 (11th Cir. 1997). Nevertheless, the court found it "apparent" that the engineer's testimony was "non-scientific" because he made "no pretense of basing his opinion on any scientific theory of physics or chemistry" but testified simply on the basis of "his experience." *Id.* at 1436.

In effect, the Eleventh Circuit established a standard for distinguishing "scientific" expert testimony from "non-scientific" testimony based solely on the expert's own untested characterization of that testimony. Under this standard, simply by asserting the absence of a scientific basis for an opinion, an expert could avoid the gatekeeper screening for reliabiilty and usefulness ordained in *Daubert*.

An expert's disclaimer of a scientific basis for his or her opinion should not be accepted where, as in this case, the expert implicitly holds himself out as one having expertise because of science-based training and experience. The engineer in this case was not a layman with no training or experience in the application of scientific principles. He had "earned a masters degree in mechanical engineering" and, based on that training, had "worked . . . for ten years in the field of tire design." *Carmichael v. Samyang Tires, Inc.*, 923 F. Supp. 1514, 1518 (S.D. Ala. 1996), *rev'd*, 131 F.3d 1433 (11th Cir. 1997). Because the engineer relied on his engineering background to qualify as an expert, there was considerable risk that a jury would not regard his testimony as that of a layperson whose testimony was based solely on experience but, rather, as an expert whose scientific training made his testimony particularly valuable or credible. Put differently, the engineer's experience was shaped and interpreted by his knowledge of and training in science and by years of applying scientific principles.

Because of the risk that a jury would assess the engineer's testimony as science-based—no matter how it was

characterized—the trial court was right to assess the reliability of that testimony under *Daubert* principles. Indeed, as the Fifth Circuit has noted, to allow experts to "escape screening by the district court simply by stating that their conclusions were not reached by any particular method or technique," would be "exactly backwards. . . . The moral of this approach would be, the less factual support for an expert's opinion, the better." *Watkins v. Telsmith, Inc.*, 121 F.3d 984, 991 (5th Cir. 1997). It is precisely when the methodology or principles of the scientific expert are not apparent that there is the greatest need for the district court to examine the process by which the expert's conclusion was reached to ensure that the testimony is adequately grounded in the methods and principles of science. *See, e.g., Cummins*, 93 F.3d at 366.

Screening of applied science testimony under *Daubert* is particularly important because such testimony inherently is based on the application of *established* scientific principles to a particular problem. Where expert testimony is based on previously unaccepted scientific theories, if admitted, the jury will be aware that the testimony is in uncharted territory and will be more careful in its evaluation of the testimony. In contrast, engineering testimony carries with it the implication that the science is well-known. Hence, there is a risk that jurors will be less skeptical about the scientific basis for the testimony than where the underlying science is hotly disputed.

Consequently, unless *Daubert* is applied, an engineering expert could testify that he or she is qualified, having practiced engineering for several years, and that the jury should simply "trust" his or her expert opinion that a product is defective, without explaining the basis for that conclusion. *See* Donald Patterson, *The Citadel Reburied: Restatement of the Law Third Torts: Products Liability*, 63 Def. Couns. J. 191, 195 (1996) (Testimony "must be something more than a bare conclusion combined with the expert's qualifications. It is no longer satisfactory for a highly qualified engineer simply to say, 'In my opin-

ion, the product is unreasonably dangerous because X design was not used. My reasons for so stating are that I am highly educated and my methodology is 'trust me.' "); *see also Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 43 F.3d 1311, 1319 (9th Cir.) ("We've been presented with only the experts' qualifications, their conclusions and their assurances of reliability. Under *Daubert*, that's not enough."), *cert. denied*, 516 U.S. 869 (1995). Such testimony would not provide the factfinder with an adequate basis for distinguishing between expert testimony based on the requisite "knowledge" and mere speculation by a hired gun. *See Developments in the Law—Confronting the New Challenges of Scientific Evidence*, 108 Harv. L. Rev. 1481, 1586 (1995) (discussing problem of "hired guns"); *see also In re Crash Disaster*, 795 F.2d 1230, 1234 (5th Cir. 1986) ("experts whose opinions are available to the highest bidder have no place testifying in a court of law, before a jury, and with the imprimatur of the trial judge's decision that he is an 'expert' ").

Daubert should thus be applied whenever a party proffers testimony from an engineer or similar applied science expert. The trial court should not accept the expert's assertion that the testimony is based on "skill" or "experience" rather than a scientific method or principle. Rather, the court should carefully examine the methodology and process by which the expert reached his or her conclusion, including, in particular, whether that testimony is based on the application of established scientific principles or knowledge.

D. The Reliability of Applied Science Expert Testimony May Be Evaluated Under the Factors Set Forth in *Daubert*

This Court in *Daubert* set forth a non-exhaustive list of four factors to guide courts in assessing proffered expert scientific testimony. 509 U.S. at 593-94. The Court emphasized, however, that "[m]any factors will

bear on the inquiry, and we do not presume to set out a definitive checklist or test." *Id.* at 593. *Daubert* thus affords trial courts ample flexibility to apply this Court's reliability standard taking into account the differences between testimony based on research or experimental science and testimony based on applied science.

While each case will depend on its own facts, as a general matter there are two factors of particular relevance in products liability cases such as this one. First, in the context of applied science, unlike that of "novel" science, the proffered expert testimony is based on established and "generally accepted" scientific and engineering principles. *See, e.g., Officer v. Teledyne Republic/Sprague*, 870 F. Supp. 408, 410 (D. Mass. 1994) (noting that "in fields like design engineering[,] . . . 'general acceptance' is the norm, not the exception"). This foundation allows the district court's screening inquiry to be more focused. To assess the reliability of applied science testimony, the threshold question should be whether the testimony is in fact grounded in established scientific principles. If not, the testimony is unreliable to the extent it purports to be applied science testimony. If this initial test is satisfied, then other considerations may become relevant.

Second, the *Daubert* "testing" requirement is particularly helpful in assessing the reliability of testimony in which an expert asserts that a product was defectively designed and could have had an alternative, safer design. *See Peitzmeier v. Hennessy Indus.*, 97 F.3d 293, 296-98 (8th Cir. 1996), *cert. denied*, 117 S. Ct. 1552 (1997); *see also Cummins*, 93 F.3d at 366; *Watkins*, 121 F.3d at 992 (noting that "alternative design[] includes more than just conceptualizing possibilities"). Unless the alternative design has been carefully considered, tested and reviewed, there can be no assurance that the proposed alternative design is feasible.[4]

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[4] For example, in *Peitzmeier*, the Eighth Circuit applied the *Daubert* factors to affirm the exclusion of engineering testimony

II. THE *DAUBERT* STANDARD SHOULD APPLY EVEN IF APPLIED SCIENCE EXPERT TESTIMONY IS CHARACTERIZED AS BASED ON TECHNICAL IN ADDITION TO SCIENTIFIC KNOWLEDGE

For the reasons given above, applied science testimony should be regarded as "scientific" within the meaning of Rule 702. However, even if such testimony is regarded as founded in substantial part on "technical" principles, the *Daubert* requirements should apply.

The Court in *Daubert* interpreted Rule 702 only as it applies to "scientific" testimony because "that [wa]s the nature of the expertise offered" in the case. 509 U.S. at 590 n.8. The Court thus had no occasion to apply Rule 702 to "technical" testimony. Nevertheless, the Court's basic teaching that a district court should assess the reliability of expert testimony applies with the same force to engineering and other applied science expert testimony as to experimental or research science testimony.

Rule 702 itself does not set forth differing admissibility standards for expert testimony depending on whether it purports to be based on "scientific" or "technical" knowledge. On the face of the Rule, therefore, the same reliability requirement applicable to "scientific" expert testimony applies to testimony by "technical" experts. That requirement should be implemented as to "technical" testimony in the same manner as "scientific" testimony because the two overlap, particularly in the case of applied science testimony.

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regarding design defects in a tire-changing machine. 97 F.3d at 296-98. The court noted that the expert had "neither tested nor designed" his proposed alternative safety devices, and had made only "rough sketches that have not been adapted into engineering drawings, much less prototypes." *Id.* at 297. Because the expert had not tested, or even designed, the proposed devices, they could not be evaluated for their "general acceptance" or rate of error. *Id.*

There is no bright line between scientific and technical knowledge. *See Confronting the New Challenges of Scientific Evidence, supra*, at 1525-26. The proposed amendments to Rule 702 take this difficulty into account by proposing a uniform reliability standard for determining the admissibility of all expert testimony. Proposed Fed. R. Evid. 702.

The difficulties in distinguishing between "scientific" and "technical" knowledge are even more pronounced in the area of applied science. By its very nature, applied science is based on both scientific and technical knowledge. In products liability cases, for example, expert testimony regarding alternative safer designs would "by definition include elements of science, technology, and methodology." *Watkins*, 121 F.3d at 991; *see also* Gordon J. Beggs, *Novel Expert Testimony*, 554 PLI/Lit. 799, 820 (1996) (technical knowledge itself can be based in part on scientific principles). Because applied science testimony inherently is based on a combination of scientific and technical principles, it would be confusing and administratively burdensome to apply Rule 702 to the same testimony under two sets of standards.

The standards for assessing the reliability of engineering and other applied science testimony also fit comfortably within the framework established in *Daubert*. The reliability of engineering and similar testimony can be determined by an examination of whether the reasoning or methodology underlying the testimony is grounded in principles and methods of applied science. *See Bogosian v. Mercedes-Benz of N. Am., Inc.*, 104 F.3d 472, 479 (1st Cir. 1997) (working under the assumption that an engineer's applied science testimony was "technical" rather than "scientific," the court analyzed the admissibility of the proffered testimony by examining the process by which the engineer developed his opinion). This is the very approach used for assessing the reliability of testimony by a research or experimental scientist under *Dau-*

bert. See 509 U.S. at 593. Thus, even if applied science testimony is regarded as testimony based in part on purported technical knowledge, an evaluation of its admissibility is dependent on the same type of factors and analysis set forth in *Daubert*.

The *Daubert* standard should also be applied because both scientific and technical testimony are "powerful" in terms of their impact on juries. *Daubert*, 509 U.S. at 595 (quotation omitted); *see also* William J. Brown, Note, *Expert Testimony in Design Defect Cases*, 37 Jurimetrics J. 285, 299 (1997) (expert testimony on the feasibility of an untested alternative design "could be opaque yet persuasive to most jurors"). Both can be "quite misleading." *Daubert*, 509 U.S. at 595 (quotation omitted); *see also Guillory v. Domtar Indus.*, 95 F.3d 1320, 1331 (5th Cir. 1996) ("where technical information is involved, it is easier for the jury to get lost in the labyrinth of concepts").

Courts and commentators rejecting the application of *Daubert*'s admissibility standard to applied science testimony generally have done so on the ground that certain of the factors listed in *Daubert* may be inapplicable to engineering and similar testimony. *See, e.g.*, Lisa M. Agrimonti, Note, *The Limitations of Daubert and Its Misapplication to Quasi-Scientific Experts*, 35 Washburn L.J. 134, 148-55 (1995); Proposed Fed. R. Evid. 702 Advisory Committee Notes 16 ("[t]he inadaptability of many of the specific *Daubert* factors outside the hard sciences (*e.g.*, peer review and rate of error) has led some courts to find that *Daubert* is simply inapplicable to testimony by experts who do not purport to be scientists"). These courts and commentators have misunderstood the basic thrust of *Daubert*, which is not about rote application of specified factors but about a careful assessment of reliability and relevance. At a minimum, applied science testimony contains a large enough element of science that it should be subject to the *Daubert* standard even if the

application of that standard might differ somewhat from "hard" science cases. As the Fifth Circuit stated in *Watkins:*

> Not every guidepost outlined in *Daubert* will necessarily apply to expert testimony based on engineering principles and practical experience, but the district court's 'preliminary assessment of whether the reasoning or methodology underlying the testimony is scientifically valid and of whether that reasoning or methodology properly can be applied to the facts in issue' is no less important.

Watkins, 121 F.3d at 990-91 (quoting *Daubert*, 509 U.S. at 592-93).

As *Daubert* itself emphasizes, trial courts have ample discretion to apply this Court's standard in a manner recognizing that the factors pertinent to assessing the reliability of applied science testimony may be somewhat different—and, indeed, more focused (*see* discussion *supra*, at 13)—than in cases involving "cutting edge" science.

III. THE FAILURE TO DEVELOP CLEAR STANDARDS FOR THE ADMISSIBILITY OF APPLIED SCIENCE EXPERT TESTIMONY WOULD ADVERSELY AFFECT INSURANCE AVAILABILITY AND AFFORDABILITY

A. "Bright Line" Standards for Admissibility of Expert Testimony Make the Tort System More Reliable and Thus Enhance Insurer Willingness to Assume Risk

There is a direct connection between Rule 702 and the role of insurers in socializing the costs of the tort liability system through the insurance mechanism. The goal of Rule 702 is to increase the accuracy of tort law outcomes by making expert testimony more reliable. That same reliability has an important bearing on an insurer's ability to evaluate risks for underwriting purposes. Accordingly, a refusal to apply the gatekeeping requirement of *Daubert*

to applied science testimony would, by aggravating uncertainty in the tort system, adversely affect the availability and affordability of liability insurance.

In determining whether to underwrite liability coverages, insurers must project the frequency and magnitude of future losses. That assessment entails not only an estimate of the riskiness of the activities engaged in by prospective insureds but also an evaluation of the potential legal exposures. Robert B. Holtom, *Underwriting: Principles & Practices* 235 (3d ed. 1987). The predictability of these risks is critical to underwriting, because unpredictable risks cannot prudently be assumed or priced. *See New Castle County v. Hartford Acc. & Indem. Co.*, 970 F.2d 1267, 1272 (3d Cir. 1992) ("insurers will only underwrite a certain, specific risk, calculable to a margin of actuarial certainty"), *cert. denied*, 507 U.S. 1030 (1993).

Legal standards governing proof of liability are a significant factor in this assessment because most policies insure against "damages" resulting from legal liability. If the legal standards are amorphous or unpredictable, and the extent of liability becomes uncertain as a result, then the assessment of risk becomes more difficult.

In the case of products liability, several layers of uncertainty exist. The substantive law of products liability is plagued with uncertainty. *See* Victor E. Schwartz & Mark A. Behrens, *Federal Product Liability Reform in 1997: History and Public Policy Support Its Enactment Now*, 64 Tenn. L. Rev. 595, 599 (1997). The admission of expert testimony can compound that uncertainty, especially because of the powerful effect of expert testimony on lay juries facing highly technical issues. *See* Imwinkelried, *supra*, at 2275 (noting that the introduction of expert testimony itself "'has done more than any one rule . . . to reduce our litigation to a state of legalized gambling'") (quoting 7 Dean Wigmore, *Wigmore on Evidence* 38-39 (3d ed. 1978)). Thus, if the standards

for admissibility of expert testimony are not well calculated to assure that a jury hears only reliable testimony, an additional and significant type of uncertainty in the tort liability system is created.

If liability and evidentiary standards are so lax that insurers cannot accurately assess risk, then insurers will either increase rates to account for the uncertainty, or, if the uncertainty is too great, will decide not to cover the risk, thereby decreasing insurance availability. 4 Fowler V. Harper, *et al.*, *The Laws of Torts* § 25.18C, at 634 (1986) ("Serious practical problems face insurers in handling insurance against potentially wide, open-ended liability. From an insurer's point of view it is not practical to cover, without limit, a liability that may reach catastrophic proportions, or to fix a reasonable premium on a risk that does not lend itself to actuarial measurement or estimate").

The constrictions on insurance availability and affordability caused by legal uncertainty have two important effects. They make insurance less efficient as a means of spreading and minimizing the costs of the tort liability system. The unavailability of insurance also adversely affects the availability of products and product innovation, as shown by several well-documented instances. *See, e.g.*, Schwartz, *supra*, at 596-97 ("[t]he availability of medical devices such as pacemakers, brain shunts, implanted defibrillators, heart valves, and hip and knee replacements used by senior citizens is critically threatened" because of products liability costs) (citing S. Rep. No. 104-69, at 51 (1995)); AMA Board of Trustees, *Impact of Product Liability on the Development of New Medical Technologies*, at 1 (June 1988) ("innovative new products are not being developed or are being withheld from the market because of liability concerns or inability to obtain adequate insurance").[5]

[5] Another example is the vaccine market, which suffered great instability in the 1980s because of uncertainty over products liabil-

Thus, issues relating to the admissibility of expert testimony under Rule 702 are not purely legal questions concerning judicial administration of federal litigation. They have significant real world implications for insurance markets. The availability of liability insurance coverage is directly dependent on the reliability and predictability of the tort system—a goal that Rule 702 not coincidentally serves.

Daubert offers a bright line admissibility standard for expert testimony in most products liability cases, one that provides assurance that only testimony based on reliable principles and methodologies will be admitted. *See* John Schofield, Note, *A Misapplication of Daubert: Compton v. Subaru of America Opens the Gate for Unreliable and Irrelevant Expert Testimony*, 1997 BYU L. Rev. 489, 515-16 (1997) (applying *Daubert* in "uniform yet flexible manner . . . would provide an element of predictability"). This assurance reduces the risk that insurers will face unpredictable or unforeseen liabilities based on unscientific or unproven theories or methodologies.

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ity exposure and manufacturers' difficulties in obtaining insurance. *See* Daniel A. Cantor, *Striking a Balance Between Product Availability and Product Safety: Lessons from the Vaccine Act*, 44 Am. U. L. Rev. 1853, 1858 (1995). Between 1980 and 1984, $3.5 billion in damages were sought by alleged vaccine injury victims under products liability theories. *Id.* at 1858. Several manufacturers ceased producing vaccines citing fears of significant financial exposure. *Id.* Other manufacturers ceased production "citing the unavailability of product liability insurance." *Id.* The few remaining manufacturers increased their prices significantly. *Id.*

The general aviation industry is a third example of declining product availability because of increasingly uncertain products liability exposure and a resulting decrease in insurance availability. *See* David J. Moffitt, *The Implications of Tort Reform for General Aviation*, 10-SUM Air & Space Law. 8 (1995); *see generally* The General Aviation Revitalization Act of 1994, Pub. L. No. 103-298, 108 Stat. 1552 (1994) ("GARA").

In sum, *Daubert*'s clear-cut admissibility standard offers the same certainty and predictability to insurers as to litigants.[6]

B. As Liability Cases Become More Complex, There Will Be Greater Reliance on Applied Science Expert Testimony and a Correspondingly Greater Need for Clear Admissibility Standards

As the new millenium approaches, liability disputes are growing more complex and are requiring the increased use of scientific testimony to assist factfinders in resolving claims. *See Joiner*, 118 S. Ct. at 520 (Breyer, J., concurring) (noting that "cases presenting significant science-related issues have increased in number. . . . 'Economic, statistical, technological, and natural and social scientific data are becoming increasingly important in both routine and complex litigation.'") (citing and quoting Judicial Conference of the United States, Report of the Federal Courts Study Committee 97 (Apr. 2, 1990)); 1 Max Schwartz, *et al., Engineering Evidence* § 1.01, at 2 (2d ed. 1987) ("As science and technology continue to develop, the gap between the layperson's comprehension of this technology and the technology itself expands. . . . Civil litigation, like technology, is becoming more complex"); *Confronting the New Challenges of Scientific Evidence, supra*, at 1531 (noting that "expert testimony continues to expand in areas that are increasingly technical and complex"). In particular, applied science expert testimony by software engineers and similar experts will grow in importance because of increasing liability claims directed at the design or performance of information technology products.

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[6] *See* Merlyn W. Clark, *The Impact of Daubert on the Admissibility of Expert Opinion*, 39 APR-Advocate (Idaho) 10, 13 (Apr. 1996) ("There is value in having standards that help to produce reliable expert opinion evidence and an argument can be made that a single standard is highly desirable. Advocates need to know with as much certainty as possible what the standard of admissibility of expert opinion evidence is going to be in a particular case. . . .").

The so-called "Year 2000" or "Y2K" problem is a prime example. The "Y2K" problem springs from a computer programming decision made decades ago to express and store "years" fields as two digit codes. For example, 1998 is entered as "98." As a result of this programming format, when January 1, 2000 arrives, computers will read "00" and confuse the year 2000 with the year 1900. The Y2K problem potentially will affect all computer-determined information based on time, including credit cards, driver's licenses, invoices, medical devices, and manufacturing and stock market operations. Computer software systems threaten to malfunction, as do billions of programmable microprocessors embedded in computer chips which regulate the flow of oil, gas, water, and electricity, and even operate intensive care units. *See Why the Year 2000 Problem Poses a Risk to the Public Health and Safety, and Continuity of Critical Infrastructure and Services, located at* <http://www.millenia-bcs.com/hlthsmry.html>.

If predictions of widespread malfunctioning by computer software systems and embedded chips are borne out, there may be extensive interruption of business and government operations, significant economic losses, and even consequential property damage and personal injury. *See* Rajiv Chandrasekaran, *Double-Zero Hour Looms for Historic Repair Job,* Wash. Post, Aug. 2, 1998, at A01 ("A growing cadre of computer experts and business analysts is issuing gloom and doom predictions about the state of the world in January 2000. Their scenarios start with minor disruptions in daily life: Airplane flights will be delayed, phone service won't work in some countries, traffic lights won't be timed properly. . . . Other forecasts warn the sky will fall: Power failures will be widespread, assembly lines will grind to a halt, automated teller machines won't dispense cash, . . . hundreds of businesses will go bankrupt."); *see also* Tami Luhby, *Fed Will Squirrel Away $50B of Cash for Year-2000 Jitters,*

Am. Banker, Aug. 19, 1998, at 16 (discussing the Federal Reserve System's $50 billion precautionary increase in cash inventory to allow for failure of automated teller machines). These losses could give rise to a wide variety of Y2K-related legal claims. *See* Rajiv Chandrasekaran, *Year 2000 Bug Could Bring Flood of Lawsuits; Litigation May Top Costs of Fixing Glitch,* Wash. Post, May 3, 1998, at A01 ("preliminary estimates for litigation and settlement costs range from $100 billion to $1 trillion. That could rival legal fees and settlements associated with such products as breast implants, asbestos or tobacco.").

The leading wave of lawsuits is likely to consist of claims that computer software or hardware was defectively designed. Several actions already have been filed based on such a theory. *See, e.g., Atlaz Int'l Ltd. v. Software Business Technologies, Inc.,* Case No. 172539 (Cal. Sup. Ct. filed Dec. 2, 1997) (putative class action by purchasers of accounting software that was not Y2K compliant against the software supplier); *Produce Palace Int'l v. TEC Am.,* Case No. 97-3330 CK (Mich. Cir. Ct. filed June 12, 1997) (supermarket sued its cash register supplier based on the inability of registers to process credit cards with expiration dates after December 1999). There may also be suits against computer consultants or software maintenance companies alleging a failure to "fix" the Y2K problem.

Actual malfunctioning of software or microprocessors may be the biggest cause of litigation. *See Year 2000 Bug Could Bring Flood of Lawsuits, supra,* at A01 ("lawsuits against technology companies may be only the first step in a years-long stream of litigation. Specialists predict that by late 1999, when some businesses start to experience system failures, a second round of chain-reaction lawsuits will ensue among all sorts of companies"). Businesses may suffer significant economic loss by reason of the shutdown of computer systems or

from profits lost as a result of computer malfunctions. There may also be claims of property damage and personal injury (*e.g.*, a factory that burned down because the software governing its fire control system did not function). These claims may not be limited to orthodox products liability theories, but may include breach of warranty claims, allegations of fraudulent inducement or misrepresentation, and novel "computer malpractice" theories.

In the vast majority of these disputes, the expert testimony of software engineers or computer science experts will be essential to appropriately decide the claimant's case. Expert testimony will be needed to determine whether the software or microchip contained a Y2K defect; whether it was feasible to detect the problem; whether there were alternative and safer designs for the software product that were technologically feasible; and whether the Y2K defect was the proximate cause of the asserted computer malfunction or other loss.

Because of the arcane nature of computer software systems and computer science, juries will tend to rely heavily on the testimony of those purporting to have expertise in the design and running of those systems. The gatekeeper function of the trial court will thus take on increasing importance as the tort system grapples with new types of information technology-related claims.

Daubert offers a principled standard for assessing the reliability of the computer science testimony needed to resolve such disputes. The whole purpose of the *Daubert* standard is to assess the reliability of the scientific principles and methodologies that underlie this type of testimony. At the same time, *Daubert* is flexible enough to allow trial courts to adapt their analysis to those special characteristics of computer-related expert testimony that differentiate it in degree, although not in kind, from other types of scientific testimony.

CONCLUSION

The judgment of the Eleventh Circuit Court of Appeals should be reversed and the *Daubert* standard should be applied to "applied science" testimony.

Respectfully submitted,

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